

with the stepping stone to artificial manufacture of the vitamin a short time later.

Study Cell Respiration

An understanding of the problem of cancer may well lie in a better understanding of how the cells of the body breathe, for the abnormal cell growth which characterizes cancer is linked with abnormal respiration, Dr. T. R. Hogness of the University of Chicago told the Conference.

Reporting spectroscopic studies he has made of respiratory enzymes, Dr. Hogness emphasized the fundamental relationship between respiration and growth, adding the prediction that the keen eye of the spectroscope, powerful scientific instrument, "will play a large role in our final understanding of cancer."

Earlier in his paper Dr. Hogness had explained how this "master key of science" had enabled marked advances in man's understanding of the role of the complex respiratory enzymes in bodily processes.

With older methods of attacking this important problem, he said, only the total effect of all cellular processes could be studied; but the spectroscope has permitted the isolation and investigation of each individual step.

The fundamental problem of cell growth, he explained, will not be understood until the respiratory process of cells is known and that depends on knowing how enzymes function in the utilization of food and oxygen.

Dr. Hogness is studying the chemical reactions whereby sugar gives up hydrogen which combines with the body's oxygen to form water. Water and carbon dioxide are the two waste products in this system, one of the simpler transitions of the many involved in life.

The first three steps are known; how the hydrogen goes from sugar to an enzyme, to another enzyme and then to cytochrome-C, another enzyme. Dr. Hogness has studied the properties of this last substance in his quest for the next one, a major missing link in the chain. Indications are that it is a very heavy protein.

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● Radio

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ENTOMOLOGY

Tons of Poisoned Bait Are Helping Grasshopper Control

POISONED bait—180,000 tons of it—is joining with the long wet spell of the early spring and summer to keep the nation's grasshopper-fighters abreast of these costly insect pests so far this season, officials of the U. S. Department of Agriculture state.

Through the great central area of the Middle West, Iowa, Wyoming, Nebraska, Illinois and South Dakota, hatching of grasshoppers has been greatly delayed by the weather. Danger points are in North Dakota, New Mexico, Texas and Oklahoma.

The grasshopper picture is changing rapidly, however, and spots which now seem to be under reasonable control may, very shortly, become a battle field between deadly bait and 'hoppers.

In all it is estimated that there are 15 different kinds of grasshoppers which annually rise up to plague the farmer. Each variety has slightly different habits and its own method of control.

The cool, wet weather of early spring and summer, for example, has helped

the farmer for those grasshoppers which lay their eggs along road sides. The wet weather has made the grass grow well in these breeding spots. The grasshoppers are thus eating this nearby food before venturing, later, into the neighboring fields.

Other grasshopper varieties which lay their eggs in the fields are, in contrast, essentially unaffected by growing grass on road sides, for their nearest food is the field crop itself.

While cool, wet weather delays hatching and stays, for a time, the danger period for grasshoppers' greatest damage, this delayed hatching taxes the piles of poison bait.

Where hatching comes along quickly and with most of the 'hoppers coming out all at once a single application of bait to the fields may suffice. In delayed hatching the grasshopper colony grows gradually and several doses of the poison are needed for control. The bait consists of a mixture of bran, arsenic and either sawdust or cotton seed hulls.

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PHYSICS

Incoming Cosmic Rays Are Predominantly Positive

SCIENTISTS believe they have an answer to the mystifying fact that the incoming cosmic ray electrons are charged with positive electricity.

The annihilation of the cores of atoms, containing only positive charges, and their conversion into cosmic rays is suggested as the cause, in a report of Profs. Robert A. Millikan and I. S. Bowen and Dr. H. Victor Neher of California Institute of Technology.

At the recent meeting of the National Academy of Sciences in Washington, the research trio told how their high-flying balloon ascensions in India, Texas, Nebraska and in Canada indicated bands of cosmic ray energies which can best be explained by the annihilation of common atoms like oxygen, nitrogen, carbon, aluminum and so on.

In their new report, (*The Physical Review*, June 1) they state:

"If there is, in fact, the possibility of the complete transformation of the mass of a nucleus into cosmic radiation, i. e., into oppositely ejected electrons (or less frequently into two oppositely ejected photons), since only positive charges exist inside the nucleus, the hitherto strange fact that the incoming electrons are certainly predominantly positive, quite possibly exclusively so, would perhaps be less surprising than it is at present."

The balloon research, they add, shows that the observed cosmic rays have never previously encountered matter as dense as the vaporous atmosphere of the earth in their age-long journeys through space. This rules out the possibility of cosmic rays originating inside stars.

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